LAND USE MAPPING AND MODELLING FOR THE PHOENIX QUADRANGLE

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15. Supplementary Notes

16. Abstract

The land use of the Phoenix (1:250,000 scale) Quadrangle in Arizona had been mapped previously from aerial photographs and recorded in a computer data bank. During the ERTS experiment, changes in land use were detected, first with the ERTS-simulation photographs, then with the ERTS-1 images when they became available. In each case, the I^{2}S Color Additive Viewer was used as the primary image enhancement tool, operated in a multi-spectral mode. A search was made for a method of creating hard-copy color composite images of the best combinations of multiband composites from ERTS, mostly by photographic and diazo processes. The I^{2}S viewer was also used to enhance changes between successive images by "quick flip" techniques or by registering with different color filters. Improved interpretation of land use change resulted, and a map of changes in the Phoenix Quadrangle was compiled using magnified ERTS images alone. The first level of a standard land use classification system was successfully used. Between the ERTS images for August and November, some differences were detected that could be caused by seasonal characteristics of vegetation or by change in use. After verification of change, the computer data bank will be updated.

17. Key Words Suggested by Author	18. Distribution Statement
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Figure 2A. Technical Report Standard Title Page. This page provides the data elements required by DoD Form DD-1473, HEW Form OE-6000 (ERIC), and similar forms.

INT. 2090-72

Type II Progress Report

ERTS-I

1 July 1972 - 31 December 1972

a. Land Use Mapping and Modelling for the Phoenix Quadrangle. (ERTS-A Proposal SR-186)

b. IN-057

c. Statement and explanation of any impedance:

ERTS images showing south central Arizona were not received until about October 1, 1972. Only one MSS band 7 image has yet been received. Copies of color transparencies are being ordered retrospectively from NASA Goddard by special order form. No cloud-free sets (MSS bands 4,5,6, and 7) have yet been received showing most of the Phoenix (Arizona) Quadrangle test site in one view, although partial sets have been received.

d. Accomplishments during the reporting period and those planned for the next period:

Experiments have been conducted using ERTS-simulation photographs of Phoenix mounted in an I^2S Color Additive Viewer. Different intensities of light have been tried in each of the ERTS wave length bands in order to determine the optimum enhancement setting for interpreting different types of land use. A hand-drawn map has been compiled showing changes in land use within the Phoenix 1:250,000 scale quadrangle detected in the ERTS-simulation photographs.

Complete coverage for the Phoenix Quadrangle has been obtained in ERTS MSS bands 4, 5, and 6. Investigation has commenced using an I^2S Color Additive Viewer when available and other magnifying equipment at times. A map of changes in land use has been compiled for the entire quadrangle using ERTS images as the only source information. No aircraft photos were consulted.

One set of RBV imagery covering most of the Phoenix Quadrangle has been received so far. Resolution poorer in quality than MSS imagery for the same area and the availability of more accurate map plotting bases has limited the usefulness of RBV imagery in experimentation during this reporting period.

A 9.5 inch false-color composite transparency has been prepared from 9.5 inch MSS band 4, 5, and 6 imagery by photographic methods which covers most of the test site. A second 9.5 inch false-color composite covering virtually the same land area as the composite previously mentioned has been prepared from 9.5 inch MSS band 4, 5, and 7 imagery by diazo copying methods. Diazo color film transparencies have been prepared from each MSS band (yellow from band 4, magenta from band 5, and cyan from band 7) and registered to create a false-color composite. Examination of 9.5 inch false-color composites prepared by both the photographic

and the diazo process has shown them to be of comparable interpretive value in many cases. Diazo process composites may be prepared quickly and at a cost at least one order of magnitude less than photographically prepared 9.5 inch color composites. A 35mm false color composite transparency of the Phoenix metropolitan area and adjacent sections of the Gila river valley has been prepared by photographing the viewing screen of an I^2S Color Additive Viewer containing 70mm chips cut from 9.5 inch transparencies of MSS bands 4, 5, and 6. In general, the MSS band color composites have been satisfactory for discriminating cropland from either rangeland or urbanized areas in Arizona. In the expanding urban fringe of Phoenix, this is a significant accomplishment.

During the next two months, the black and white 9.5 inch transparencies will be tested on other image enhancing equipment, e.g., color or density slicing. Aircraft photography will eventually be used to check the accuracy of the interpretations from ERTS imagery.

e. Scientific results and practical applications:

Experimentation with multiband ERTS-simulation photographs in an I^2S Color Additive Viewer has indicated that high intensities of light in the infrared band greatly enhance

the interpretability of vegetation patterns, including landscaping within urban areas. Non-vegetative, man-made patterns are emphasized in the red and green bands. Interpretation of those photographs allowed compilation of a map of land use change in the Phoenix area.

Experimentation with 70mm squares cut from ERTS 9.5 inch MSS transparencies (bands 4, 5, and 6) in an I^2S Color Additive Viewer, a Richardson Film Projection Viewer at 10 X magnification and in microfische viewers at 12 X and 18 X magnification has indicated that band 5 photography provides the most useful interpretable data. In the I^2S viewer high intensities of blue and red light in bands 4 and 6 respectively enhance faint vegetation patterns not easily detectable. Slides produced from 35mm color transparencies made by photographing the I^2S viewing screen are suitable for use during presentation.

Interpretation of MSS transparencies allowed compilation of a map of land use change in the Phoenix Quadrangle.

Examination of MSS imagery obtained over a three month period has indicated that seasonal changes affect accurate detection of agricultural land use change. Experimentation with 9.5 inch color composite transparencies produced by

photographic and diazo processes and 35mm color composite transparencies produced by photographing an I^2S viewing screen are of comparable interpretive value when the 35mm transparency is viewed on the Richardson Film Viewer at 10 X magnification. (Category 2H, Land Use Survey and Mapping, General)

f. Published reports or talks:

Place, John L., and Wray, James R., 1972, Automated plotting and update of land use maps and related information in south central Arizona: Tucson, Arizona, Proceedings of the Conference on Remote Sensing on Arid Lands, November 8 - 10, 1972.

g. Recommendations for improvement:

It would be advantageous to send out all four bands of ERTS MSS imagery to those principal investigators requiring color infrared composites for their work. Although the 9.5 inch transparencies definitely are useful, some distribution of the 70mm images might help also in allowing a broad overview in the Color Additive Viewers.

h. Changes in Standing Order Forms:

None

i. ERTS Image Descriptor Forms:

ERTS Image Descriptor Forms are attached at the end of this report.

j. Changed Data Request Forms submitted to Goddard Space Flight Center/NDPF:

None.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
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ID

DATE 1 January 1973

PRINCIPAL INVESTIGATOR John L. Place

GSFC IN - 057

ORGANIZATION Geographic Applications Program, U.S.G.S.

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Urban Ar	Agricult	Rangelnd	
1014173825	x	x	x	
1031173225	x	x	x	
1031173226				LAKE
1031173255	x	x	x	
1032173825	x	x	x	
1032173826				LAKE
1032173845		x	x	
1033174355		x	x	
1033174415			x	
1049173225			x	
1049173226				LAKE
1049173245	x	x	x	
1049173246				LAKE
1050173804		x	x	
1050173806				LAKE
1050173835	x	x	x	
1051174345		x	x	
1051174415		x	x	
1103173305	x	x	x	
1103173306				LAKE
1104173845	x	x	x	
1104173846				LAKE
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